

RUSSIAN AND AMERICAN AVIATION SAFETY AND HUMAN FACTORS A CULTURAL COMPARISON

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ABSTRACT

Since the transition from the Soviet Union to the Common Wealth of Independent States (CIS) numerous changes have occurred in aircraft systems and accident rates. Western influences have had impacts on aviation, politics, economics and culture. In 1998 Russia signed a mutual understanding agreement with the U.S. on sharing information regarding investigating and preventing aircraft mishaps. This agreement has allowed for the disclosure of aircraft regulations, accident reports and human factors. Russian experts prioritize methods of deciding problems of safety and human factors differently than the U.S. and other Western aviation experts. Comparing U.S. and Russian approaches to safety and human factors shows where the two cultures meet and diverge. Both can be beneficial to the globalization process.

INTRODUCTION

Events in the Commonwealth of Independent States (CIS) have been written extensively in worldwide public press since the fall of the USSR. The economy has been near collapse, however aviation research and new aircraft production have, with much necessity continued. There was a rapid influx of American and other Western companies to introduce their products into the new marketplace. Both Boeing and Airbus began to sell the new advanced cockpit aircraft to the vast airspace of the CIS consisting of Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tadjikistan, Turkmenistan, Uzbekistan and Ukraine with the Republics of Latvia and Estonia having observer status. This airspace includes over 8 time zones.

According to a report of the Interstate Aviation Committee (IAC) impacts in the role of aviation have had major challenges due to the international and domestic safety challenges, competition, foreign aircraft, rules and regulations and a differing cultural approach to safety and human factors. This led to the signing of important intergovernmental documents, including a memorandum of understanding in the area of the

investigation and prevention of aviation accidents. These were signed on 2, September 1998, at a meeting of the Presidents of Russia and the U.S.A. This was the first time an intergovernmental document devoted to aviation accident investigation and accident prevention had been signed at such a high level (Teymrazov, Kofman, Angelova, 1999).

Currently, aircraft operations in the CIS utilize a fleet in operational condition, consisting of three basic groups:

- “• regular passenger transportation on internal and international routes by heavy airplanes (Class 1 - 3, Takeoff weight over 10 tonnes);
 - non-regular (chartered) passenger and cargo transportation on airplanes of classes 1 - 3;
 - aviation transportation and operations in the national economy on helicopters and light airplanes of class 4.
- Of the fleet of aircraft in operational condition, one may single out three basic groups, which are being executed:
- regular passenger transportation on internal and international routes by heavy airplanes (Class 1 - 3, Takeoff weight over 10 tonnes);
 - non-regular (chartered) passenger and cargo transportation on airplanes of classes 1 - 3;
 - aviation transportation and operations in the national economy on helicopters and light airplanes of class 4” (Teymrazov, et. al., p. 1, 1999).

AVIATION CHALLENGES

Accident rates increased dramatically following the collapse of the USSR. in all categories of civil aircraft. The accident rate began to raise beginning in 1992 and continued through 1997. An analysis of the state of the accident rate in regular passenger transportation on internal and international routes in 1998 shows positive trends towards flight safety in this type of transportation. In 1998 regular passenger transportation had no catastrophic events, however the accident rate in non-regular transportation, i.e. charter passenger and cargo transportation in heavy non-scheduled aircraft has seen no essential downward trend. (Teymrazov, et. al., 1999). Figures 1 and 2 show

the display the trends. It is important to point out that the FAA defines an accident by injury or fatality or a monetary amount of the aircraft

damage and all other events are incidents. In the USSR and CIS they are categorized as accidents and catastrophes.

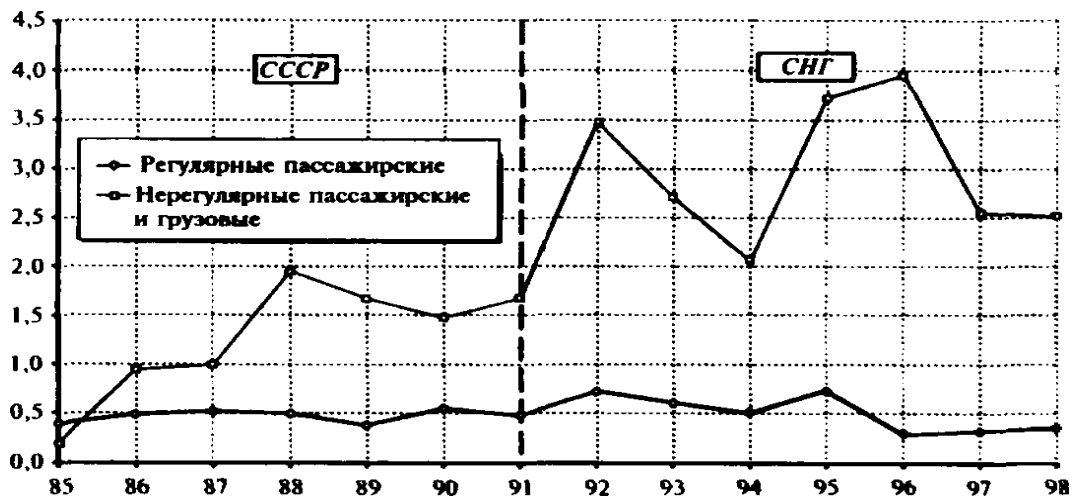


Figure 1. Number of aviation accidents per 100,000 hours of flying time in aircraft of classes 1 - 3 in civil aviation of the participant states of the Agreement

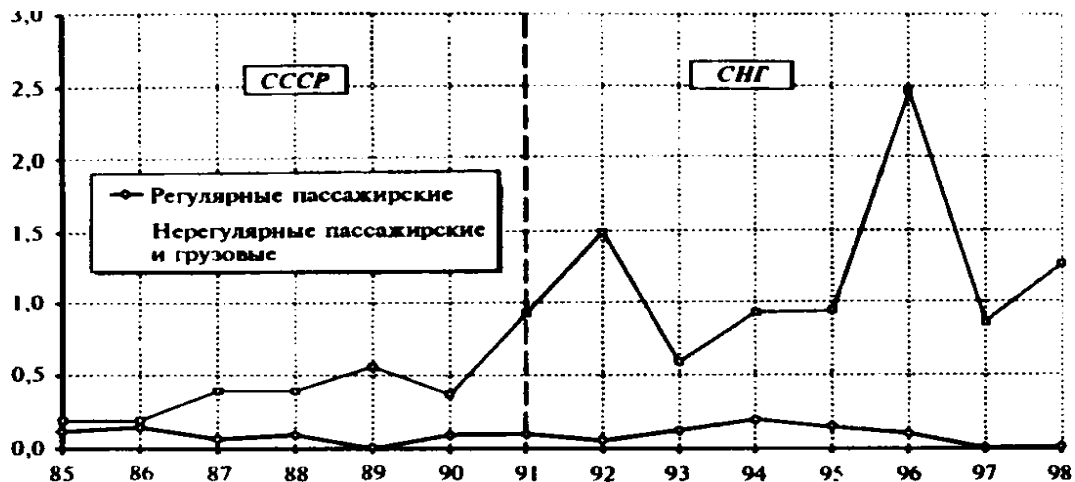


Figure 2 Number of catastrophes for 100,000 hours of flying time in aircraft of classes 1 - 3 in civil aviation of the participant states of the Agreement

Figure 3 displays and compares worldwide status. "The level of flight safety in regular passenger transportation in the civil aviation of the former USSR and the CIS has remained practically unchanged, better than the average for the ICAO,

has a positive trend in recent years and comparable with the indicators of the U.S.A" (Teymrazov, et. al., p. 5, 1999).

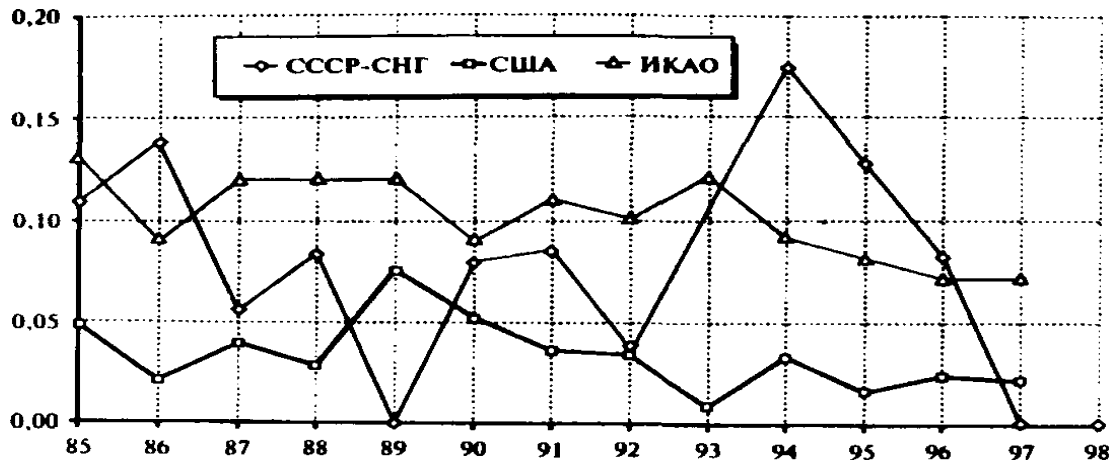


Fig. 3 Number of catastrophes per 100,000 hours of flying time in the regular transportation in the USSR — CIS, U.S.A., ICAO. Information source: Annual Report of the ICAO Council for 1997. Doc. 9700. New NTSB Washington D.C 20594

GENERAL AVIATION

General Aviation (GA) consisting of class 4 aircraft, as described above, is in a new phase of attempting commercialization in Russia. Economics at the current time makes this transition a slow going process, however it is occurring. This process comes with not only financial challenges, but with a new set of safety problems, in a vast land with little preparation for the operation of these types of aircraft with no applicable airspace rules, airports, proper lighting and radio communications capabilities (Poltavet, V.A., Plaksina, E. A, 1999).

However, “the reduction in the volumes of air transportation and aviation operations due to a lowering of industrial capacities, a reduction of the

demand for this type of activity as a result of the increase in the cost of transportation, and also of the lowering of the population's and enterprises' ability to pay is a characteristic of the changes in civil aviation in the post-Soviet period. The volume of transportation during the period of conversion in civil aviation has gone down (1992 - 1997) by 3.8 times. Air transportation and operations in low-powered aviation also have decreased especially sharply within the regions. During this same period their volume has decreased by 6.5 times. At the same time the flying time of the airlines' most popular airplane of local significance, the An-2, has decreased by 10 times in the participant states of the Agreement” (Poltavet, V.A., Plaksina E.A, p.1, 1999).

Information about the accident rate in helicopters and light aircraft are presented in the table

Indicator	Years						
	1992	1993	1994	1995	1996	1997	1998
Number of Aircraft Accidents	133	93	52	45	37	29	32
Catastrophes in that Number	26	12	12	12	9	10	8
Number Killed	102	66	46	62	47	51	24
Number of Aircraft Written off	80	45	36	38	29	19	22

Accident causes are very specific and very similar to those found in GA accidents in the U.S. The causes consist of the following: “loss of orientation, helicopter transmission, type of event not

established, illegal acts, contact with the ground of wing, prop, landing outside of the intended zone, nose over/upset, loss of maneuverability on the ground, flight during weather below minimums,

running off the runway, deviation from flight plan, switching off of engines, rough landing, deviation from flight restrictions, impact with ground, impact with objects, loss of control in flight, loss/malfunction of engine(s)” (Poltavet, V.A., Plaksina E.A, p.4, 1999)

RUSSIAN APPROACH TO AVIATION SAFETY AND HUMAN FACTORS

A discussion paper written by Y.M. Khokhlov, President of the Scientific and Methodological Center of Professional Analysis, Chairman of the Russian Air Crew Association Human Factors Committee, stated several perspectives that differ with American and ICAO approaches to resolving human factors and safety in aircraft operations.

Khokhlov states that “the problem of human factors and flight safety is pertinent to the intellectual property marketplace. Not one state of the CIS was ready for this market. The more apparent event in the marketplace of the intellect was the exclusion of government registration of scientific breakthroughs and the reduction of them to the level of simple know-how. From consultations with foreign marketers it became clear that it is necessary to find a “niche” in the market, where one may sell the product” (Khokhlov, K.M., p.1, 1999). “Under the conditions of today’s contacts it is extremely simple for the specialist to get information about approaches to flight safety in the worldwide aviation community. The task of proving the presence or absence of a worldwide scientific priority is decided by means of a comparative analysis of the proposed approaches – of the methodology and technology, of the programs and the procedures with those existing in the ICAO or the approaches of the Boeing firm, who is working, as is known, in the area of flight safety on a worldwide scale” (Khokhlov, K.M., p.5, 1999).

Khokhlov states that the methodologies of Russian safety and human factors research and implementation approaches remain not only different from the American and ICAO approaches, but excluded from the Worldwide scientific approach. Worldwide “researcher have long demonstrated in age old facts that the concealment of Russian priorities in worldwide science is a historic phenomenon” (Khokhlov, K.M., p.5, 1999).

The Russians have a Priority-driven Methodology consisting of a process methodology: the process,

process analysis, general theory of processes and process engineering. Whereas, the Americans use a systemic methodology: the system, system analysis as a standardized methodology, a general theory of systems, system technologies and models of the man-machine systems. “Process analysis is a priority-driven scientific methodology of a huge commercial business, based on the theory of an age-old business profile, a general theory of processes, a theory of qualitative uncertainty, a generalized theory of limits and other theories, which permit the resolution of the more complex scientific and practical problems of the enterprises. The problem of flight safety and the problem of human factors (crew, pilot, flying unit, airline, etc.) connected with it pertain exactly to such tasks and they are solved by the methods of process analysis. The Americans and other Western aviation specialists do not have such a methodology and such approaches. Russia possesses an absolute scientific priority on such a methodology” (Khokhlov, K.M., p.4, 1999).

Several of the Priority-driven approaches of Khokhlov are stated below: first, a new theory of positive flights or negative flights, i.e. catastrophic events are compared as opposite events opposed to the Western statistical compilation of accidents. Second, the new Russian approach to human factors is profoundly different than the American approach where the emphasis is orientation on the pilot’s, professional qualities, characteristics and psychophysiological activities “the American researchers placed the pilots’ characteristics in the fore of all research” (Khokhlov, p.5, 1999). In Russia, human factors are not based on the behavior of pilots, but rather the analysis of flight as a centralized production process in aviation, or “From pilot to flight” “such is the priority-driven approach to the research of human factors, when conclusions and results on human factors are created on the basis of the process analysis of flight. The uncertainty of analysis of a multitude of pilots’ characteristics as a group of indicators at the same time is removed, while focusing on flight allows sufficiently deep analysis. The slogan “From pilot to flight” is the primary slogan of all the programs, which the SMCPA – the Scientific and Methodological Center of Process Analysis – is executing or developing at the present time” (Khokhlov, p.5, 1999). Thirdly, “Aviation accidents have no relationship to flight safety. The danger and safety of flight are completely polar-opposite categories (logical universals); therefore, aircraft catastrophes as negative events or occurrences are connected not with safety, but with the danger of flight. In order to resolve the problems

of flight safety and human factors it is necessary to exclude aircraft accidents from the analysis of flight safety and to limit this analysis within the framework of analysis of flight danger” (Khokhlov, p.6, 1999). Fourth, human factors are normal actions or reactions to the unexpected or surprise. “The paradox consisted in that it has been established by research: the central reason for aircraft accidents through human factors (the crew) is normal (and not wrong!) pilot actions, which are caused by absolute surprise and the unexpected. Such a concept of the causality of aircraft accidents through human factors (the crew) is called the concept of intensified secondary pilots movements in aircraft accidents. It is completely priority-driven and leans on the works of the Russian scholar of psychophysiology, I. M. Sechenov” (Khokhlov, p. 9, 1999).

Although Khokhlov expresses different approaches to human factors and flight safety he will support ICAO. “That is why at the present time a draft of our priority-driven approaches to flight safety and human factors ICAO circular has been sent through the ICAO representative in Russia – the developments of 1985 – 1995, the work of a different standard” (Khokhlov, p. 10, 1999).

CONCLUSION

The conversion from the USSR to the CIS has been a tumultuous transition. Aviation catastrophes rates increased as government control was in turmoil. In recent years, following the intergovernmental agreement, signed by the presidents of Russian and the United States. Aviation accident information is now shared and shows a reduction in both accident and catastrophes, . It is difficult to attempt to measure the possible affects on the culture as Western influences were immediate. However, as Khokhlov maintains Russia still utilizes traditional psychological approaches, as well as new directives that disagree with Western approaches and accidents rates show improvement as there is a definite belief that there has been no safety or human factors influence from the U.S., in particular Boeing, or ICAO. However, Worldwide involvement is necessary. Russia must participate in order to improve economic conditions.

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